

### REMARKS

Reconsideration of this application and entry of this Amendment is respectfully requested.

Applicants acknowledge the withdrawal of claims 14-16 and respectfully request reconsideration of the restriction of claims 14 and 15 because it appears that the reasons for maintaining the restriction requirement have not followed the criteria set forth in Chapter 800 of the MPEP, and criteria set forth in PCT Rules 13.1, 13.2 and 13.4. Furthermore, the examiner's citation of prior art against claim 1 appears to implicitly indicate that a search of claims 14 and 15 would not be unduly burdensome.

The examiner's summary dismissal of applicants' arguments traversing U.S. Patent 5,115,868 to Dougherty, Jr. et al by simply relying on the International Preliminary Examination Report dated September 5, 2001 also does not appear to be in accordance with USPTO practice.

Moreover, applicants' response to the Australian Examination Report prepared by the same Australian examiner that prepared the International Preliminary Examination Report overcame the objections set forth in the International Preliminary Examination Report.

Applicants traverse the rejection of claims 1-8 and 10-12 under 35 USC §103 as unpatentable over PCT Publication WO 96/22129.

Applicants' claimed invention is a cover gas composition and method adapted for the protection of molten magnesium/magnesium alloy. In contrast, the PCT Publication WO 96/22129 relates to a fire extinguishing process and composition for Class A (trash, wood, or paper); Class B (flammable liquids or greases); and/or Class C (electrical equipment) fires (page 2, lines 12-22 and page 16, lines 7-12). There is no disclosure or suggestion in PCT Publication WO 96/22129 of a cover gas composition and method adapted to protect molten magnesium/magnesium alloy.

Moreover, those skilled in the art know that there is an art recognized distinction between:

- (a) cover gas compositions for protecting molten magnesium/magnesium alloys, and
- (b) fire extinguishing compositions.

Cover gas compositions used to protect flammable substances, such as molten magnesium/magnesium alloy differ from fire extinguishing compositions in three significant ways as follows:

1. Cover gas composition contain a minimal amount of active inhibiting agent to prevent fires. Applicants' invention discloses and claims less than 1% by volume of the fluorine containing inhibiting agent (claims 10, 11 and 12). The use of such small amounts of active inhibiting agent is not simply an economic decision. In magnesium foundries, fluorine

containing active agents form hydrogen fluoride (HF). The presence of hydrogen fluoride in a magnesium foundry is undesirable because large amounts can cause severe corrosion to foundry equipment, including steel crucibles which contain molten magnesium.

It is known, for example, that cover gas compositions containing 2% by volume sulfur hexafluoride ( $\text{SF}_6$ ) have resulted in severe corrosion problems. Also, serious injury can result from  $\text{SF}_6$  reaction products with steel that can react explosively with molten magnesium. Therefore, the minimal effective amount of active inhibiting agent in a cover gas composition to protect a molten magnesium/magnesium alloy is most desirable.

In contrast, fire extinguishing compositions contain significantly higher levels of active agent than a cover gas composition because when a fire must be extinguished, the important and immediate concern is to put out the fire quickly. Accordingly, the greater amount of active agent in a fire extinguishing composition renders such compositions unsuitable as a cover gas composition.

The examiner's attention is respectfully invited to Table C on page 31 of PCT Publication WO 96/22129 wherein the concentration of active fire extinguishing agent varies from 3 to 11.9 volume percent. Thus, the smallest concentration of fire extinguishing agent disclosed in PCT

Publication WO 96/22129 to Flynn is 300 volume percent greater than the largest concentration of inhibiting agent in applicants' claimed cover gas composition.

2. Cover gas compositions are used in the form of constant, small, quiescent flows of gas to prevent magnesium vaporization and subsequent combustion by producing a very thin surface layer or film on the molten magnesium/magnesium alloy that is impervious to magnesium vapor. The surface layer is on the order of 1 micrometer of magnesium oxide and magnesium fluoride. In contrast, fire extinguishing compositions are used after combustion occurs and are delivered in huge rushes of gas to extinguish a fire quickly.

3. Cover gas compositions are used at low pressures, for example 10-25 % above atmospheric pressure. In contrast, fire extinguishing compositions are used at significantly greater pressure and are thus unsuitable as a cover gas composition.

The examiner's reliance upon In re Boesch, 205 USPQ 215, does not resolve the deficiencies of PCT Publication WO 96/22129. Boesch stands for the holding that discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art. That is not the situation here. Applicants respectfully submit that their claimed composition and process are not known.

In fact, the examiner admits that PCT Publication WO 96/22129 does not disclose a cover gas for molten magnesium (last two lines of page 3 of Official Action). Therefore reconsideration and withdrawal of this ground of rejection is respectfully requested.

The rejection of claims 1-12 under 35 USC §103 as being unpatentable over U.S. Patent 5,115,868 to Dougherty, Jr. et al is also respectfully traversed.

Dougherty discloses a composition consisting essentially of trifluoromethane to prevent and/or extinguish fire. Applicants' invention does not include trifluoromethane. Dougherty discloses that trifluoromethane may be used in conjunction with as little as 1% of at least one halogenated hydrocarbon (column 2, line 65 to column 3, line 7). The flammable materials disclosed in Dougherty are paper, cloth, wood, flammable liquids, and plastic items (column 3, lines 64-68), not molten magnesium/magnesium alloy. There is no disclosure or suggestion in Dougherty of a cover gas composition or method adapted for the protection of molten magnesium/magnesium alloy.

Dougherty discloses that trifluoromethane has an extremely low boiling point and a high vapor pressure. Therefore, it acts as a propellant for fire extinguishers (column 4, lines 18-21). As the propellant, the trifluoromethane comprises from 0.5 weight percent to 99 weight percent of

the mixture. When trifluoromethane acts as its own propellant, it comprises 100% of the propellant extinguisher mixture (column 4, lines 31-38).

The examiner's reference to Examples 1 and 5 in Dougherty are also not relevant because each example relates to fire extinguishing concentrations of active agent on the order of 8.7-23.8 volume %. This amount is over 800 volume % greater than the largest concentration of inhibiting agent in the cover gas compositions claimed by applicants. Again, the examiner's reliance upon the In re Boesch decision is not relevant as to the deficiencies of Dougherty. Moreover, the examiner has admitted that Dougherty does not disclose a cover gas for molten magnesium (Official Action, page 3, last 2 lines). Therefore, reconsideration and withdrawal of this ground of rejection is respectfully requested.

The rejection of claims 1-8 and 10-12 under 35 USC §103 as unpatentable over PCT Publication WO 91/02564 is also respectfully traversed.

PCT Publication WO 91/02564 discloses the use of blends of hydrofluorocarbons and other fire extinguishing agents to extinguish fires rapidly (page 2, line 25 to page 3, line 1). The concentration of the fluorinated fire extinguishing agents varies from about 3-15 volume %, preferably 5-10 volume % (page 4, lines 22-25). The hydrofluorocarbons

are present at a level of at least 10% by weight of the blend (page 5, lines 33-36 and page 6, lines 22-36).

All of the examples in PCT Publication WO 91/02564 relate to fire extinguishing compositions. The volume of fire extinguishing agent ranges from 2.4 volume % to 14.1 volume %. This is in contrast to the active agent in applicants' cover gas composition which has a volume percent of less than 1%.

Moreover, the examiner admits that PCT Publication WO 91/02564 does not disclose a cover gas composition adapted for the protection of molten magnesium/magnesium alloy (page 3, last two lines of Official Action). The examiner's reliance on the decision of In re Boesch does not resolve the significant deficiencies of PCT Publication WO 91/02564. Therefore, reconsideration and withdrawal of this ground of rejection is respectfully requested.

The rejection of claims 1-12 under 35 USC §103 as unpatentable over the previously relied upon PCT Publication WO 96/22129, U.S. Patent 5,115,868 to Dougherty et al and PCT Publication WO 91/02564 further in view of U.S. Patent 6,167,944 to Ricketts et al is respectfully traversed.

Applicants have discussed in detail the individual deficiencies of PCT Publication WO 96/22129, Dougherty and PCT Publication WO

91/02564. Moreover, the examiner has admitted that these references do not disclose a cover gas for molten magnesium/magnesium alloy. The combination of these references only compounds the deficiencies of each reference. These deficiencies are further compounded by the examiner's reliance on U.S. Patent 6,167,944 to Ricketts et al.

Ricketts et al discloses a method and system for ingot mold casting of metals and the use of an inert protective gas supplied to the space where the casting occurs. The inert gases include nitrogen, argon or a mixture of nitrogen and argon, a dilute sulfur hexafluoride/air mixture, dilute sulfur hexafluoride/carbon dioxide mixture or a combination of air, carbon dioxide and sulfur hexafluoride (column 4, lines 50-58).

Ricketts et al do not disclose or suggest a cover gas composition adapted for the protection of molten magnesium/magnesium alloy containing a hydrofluorocarbon, hydrofluoroether or combination thereof as the protective agent.

Moreover there is no incentive in Ricketts or any of the other prior art relied upon by the examiner to collectively suggest the claimed invention. It is respectfully submitted that a rejection of this type is based on hindsight reconstruction. The conclusions made by the examiner are not suggested in an obvious manner by the combination of references. The examiner's additional reliance upon the In re Boesch decision does not




resolve the deficiencies of the rejection. Therefore, reconsideration and withdrawal of this ground of rejection is respectfully requested.

Applicants also want to bring to the examiner's attention U.S. Patent 6,537,346 to Milbrath et al (copy enclosed) and request that the examiner confirm that the subject patent application antedates the Milbrath patent as a reference.

Applicants have also submitted new claims 17-33 to recite various other embodiments of the invention. No new matter has been added. It is respectfully submitted that claims 1-12, 14, 15 and 17-33 are now in condition for allowance.

Respectfully submitted,

  
Charles B. Rodman, Reg. No. 26,798  
Attorney for Applicants

Dated: September 26, 2003  
RODMAN & RODMAN  
7 South Broadway  
White Plains, New York 10601  
Telephone: (914) 949-7210  
Facsimile: (914) 993-0668  
869-18

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